

REMARKS

Reconsideration and allowance are respectfully requested. Claims 13-25 are currently pending. Claims 13-20 and 23-25 were rejected. Applicants thank the Examiner for allowing Claims 21 and 22. Claim 13 has been amended for clarity. No new matter has been entered. Based on the following remarks, it is believed that all pending claims are in condition for allowance and a notice to that affect is respectfully requested.

I. §103(a) Rejection based on Takeuchi and Hong

Claims 13-18, 23 and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,141,061 to Takeuchi in view of U.S. Patent No. 5,706,063 to Hong. Based on the following remarks, Applicants respectfully traverse this rejection.

A. The Present Invention

The present invention relates to a single polarizer display projector that is capable of maintaining an accurate white balance or color tone of a projected picture while also providing good contrast levels within the picture. As emphasized in the Background of the Invention of the present application, conventional video projectors work with a video signal that is comprised of individual red, green and blue (RGB) color components. These individual RGB components are sequentially brought together to form a continuous type of video signal that is used to control both a color switch and a panel display. As illustrated by the example color switch signal (d) in Figure 11, this video signal can be thought of as comprising a plurality of color images or frames, with each frame comprising one red signal component, followed by a similar green signal component and then a blue signal component.

To assure accurate color reproduction of a video signal image, traditional projectors have the ability to adjust the

white balance or color tone of the video signal. This white balance control is accomplished by adjusting the duration and timing of the individual red, green and blue (RGB) components of the video signal. However, while this type of signal adjustment allows for more accurate color reproduction, it also results in deterioration in the contrast of the projected image. Specifically, adjustment of the individual RGB components, for the purpose of improving color balance, also results in the introduction of time lags in the video signal. An end result of these subsequent deviations in the timing of the video signal is a projected image having improper contrast levels.

The present invention overcomes the limitations of the prior-art described above, by providing, as called for in independent claim 13, a single polarizer image display projector, comprising:

an image processing circuit for scaling processing of an image;

a gamma correction circuit for subjecting a color to gamma correction to obtain a color suitable for a display on a display panel;

a panel drive circuit for driving the display panel;

a color switch for selecting a color with a specific color tone to be displayed;

a color switch drive circuit for determining the mean luminance of picture element data outputted from the image processing circuit; and means for inserting a white color or black color among displayed gradations of R, G and B lights according to the value of the mean luminance to expand the dynamic range for image display.

(emphasis added).

B. The Takeuchi Reference

In contrast to the invention as called for by independent claim 13, the reference of Takeuchi simply discloses an image reduction and enlargement process for a conventional projection system. Additionally, the conventional projection system that Takeuchi discloses is not even of the type that utilizes a color switch for selecting and displaying a specific color. (See Takeuchi, Fig. 1, in which the block diagram of the Takeuchi system indicates the driving of a LCD display panel, but no color switch.) Furthermore, the Office Action acknowledges that Takeuchi "does not teach a single polarizer image display projector wherein white or color data is inserted among the data of the R, G, and B color tones."

C. The Hong Reference

In contrast to the invention as claimed above, Hong discloses a multiple polarizer projection system that does not insert a black-and-white signal component among the RGB components, but instead superposes an entirely separate black-and-white signal over a color signal.

Specifically, with reference to Figure 2 of the reference, Hong discloses a LCD projector system where light from a lamp 31 is directed onto a polarizing beam splitter (PBS) 32. The light incident upon the PBS 32 is subsequently split into s and p waves of linearly polarized light, with the s-polarized light reflecting off of the PBS 32 while the p-polarized light passes through the PBS 32.

The s-polarized light that reflects off of the PBS 32 subsequently passes through a first lens 33 and a quarter-wavelength polarizing board 35, and then falls upon a first LCD panel 37 configured to display a color image. This light subsequently reflects off of the "color" LCD panel 37, becoming an optic color signal. As the light of the color signal returns back toward the PBS 32, it again passes through the quarter-wavelength polarizing board 35, which converts the s-polarized light into p-polarized light. The p-polarized

light of the color signal then passes through the PBS 32 and is ultimately projected onto a screen (S) by means of a projecting lens 39. (See Hong, 3:27-43)

In a similar fashion, the p-polarized light coming from the lamp 31 passes through the PBS 32, a second lens 34 and second quarter-wavelength polarizing board 36, and is subsequently projected upon a second LCD panel 38 configured to display a black-and-white image. The light reflecting off of the "black-and-white" LCD panel 38 then becomes an optic black-and-white signal. As the light of the black-and-white signal returns back toward the PBS 32, it again passes through the second quarter-wavelength polarizing board 36, which converts the p-polarized light into s-polarized light. The s-polarized light of the black-and-white signal then reflects off of the PBS 32 and is also projected onto the screen (S) by means of the projecting lens 39.

Accordingly, Hong fails to disclose a projection system where a black and/or white signal is inserted among the RGB components of a color signal. (See signal (f) of Applicants' Figure 4 for an example of such a signal) Instead, Hong discloses a system that generates a color signal and an independent black-and-white signal. Furthermore, the color signal and the black-and-white signal are simultaneously projected onto a screen in such a manner that a black-and-white image produced by the black-and-white signal is superimposed, or placed on top of, the color image projected onto the screen by the color signal. (See Hong, 3:48-51) As such, the reference of Hong does not disclose a system similar to the claimed invention, but instead a significantly different system that generates a separate black-and-white signal that produces a black-and-white image that is subsequently superimposed on top of a color image. For the above reasons, Applicants believe that independent claim 13, along with claims 14-18, 23 and 24 dependent therefrom, are allowable over the references of Takeuchi and Hong, taken either individually or in combination.

II. §103(a) Rejection based on Takeuchi, Hong and Satake

Claims 19, 20 and 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Takeuchi and Hong in view of U.S. Patent No. 6,904,930, 052 to Satake et al. Based on the following remarks, Applicants respectfully traverse this rejection.

The Office Action asserts that the combined references of Takeuchi and Hong disclose the invention as claimed except for a D/A conversion circuit, and that the addition of such a circuit would have been obvious in view of Satake. The disclosure of Satake focuses on a new type of LCD screen, and is not even directly concerned with a projector system. Accordingly, Satake fails to provide for the deficiencies of Takeuchi and Hong, as noted above. For the above reasons, Applicants believe that claims 19, 20 and 25 are allowable over the references of Takeuchi, Hong and Satake, taken either individually or in combination.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance, and a Notice to that effect is earnestly solicited.

Respectfully submitted,


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